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Agricultural Memorandum No. 789
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SUGAR BEET IN LOWLAND LANCASHIRE

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1. Background. At present only a small acreage of sugar beet is grown in Lancashire, partly because of high transport costs to the nearest factory. It is possible that a processing plant may become available locally, if sufficient beet can be produced in the area. This note looks at the effects of climate on the prospects for the crop, by comparison with the Vale of York and with East Anglia.

2. Areas for Comparison. The attached map shows the agroclimatic areas currently used by the Meteorological Office. Area 9 is lowland Lancashire and at present only grows a little beet. In area 12 (Vale of York) beet is an established crop, but not so important as in area 24 (Norfolk) where the area of sugar beet is probably as large as accepted rotations will bear. Data for the three areas were extracted from an advance copy of the new bulletin on the agricultural climate of England and Wales, by L P Smith.

3. Sowing and Establishment. Good crops of beet require early sowing and a good stand. Table 1 shows the last dates at which soil moisture is at field capacity in the three areas:

TABLE 1 - Last Dates of Field Capacity

Agroclimatic Area	Median Date	Quartile Range
9	1 May	11 April-19 May
12	8 April	19 March-6 May
24	2 April	18 March-23 April

These are the dates on which moisture deficits develop which will persist all through the summer, and it will be seen that they are three weeks later in Lancashire than the Vale of York, and a month later than in Norfolk. However, before the deficits finally develop there will be spells when the surface soil dries up for a few days. These are likely to be sufficient to permit drills to go on the land, particularly on the free-draining sands.

Table 2 shows the start of the growing season (for grass) in the three areas. Though not strictly applicable to beet, the differences between areas are relevant. The Atlantic influence gives Lancashire just a few days' start on the other areas.

TABLE 2 - Median Date of Start of Growing Season

Agroclimatic Area	Median Date
9	23 March
12	28 March
24	26 March

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Prolonged dry conditions after sowing, and consequent bad effects on germination and emergency, are much less likely in Lancashire than in the two eastern areas.

Cold weather after emergency can increase the risk of bolting, particularly with some varieties. This is less likely to happen in Lancashire than in the eastern areas, mean dates of last frost being late April and early May respectively.

4. Growth Through the Season

a. Available Energy. Sugar beet has a lot of photosynthesis to do, and the available solar energy is therefore important. The net radiation (incoming minus outgoing) is in Britain very closely related to the potential transpiration (PT) ie the transpiration from a crop not under water stress. The PT is calculated as a routine, so is convenient for use as a relative measure of available energy. Table 3 gives the comparison.

TABLE 3 -Potential Transpiration (mm) through the growing season

Area	April	May	June	July	August	September	Total
9	57	85	95	91	77	48	453
12	53	77	86	86	69	43	414
24	57	85	95	95	77	50	459

Through the season lowland Lancashire receives some 10% more energy than the Vale of York, and nearly as much as East Anglia, though with a slight falling off at the end of the summer.

b. Available Moisture. When established, sugar beet is capable of extracting moisture from depth. The wilting which can often be seen in hot dry weather is a sign that water is not being transferred quickly enough to the leaves, but th plants recover after dusk. However, the closure of the stomata on wilting will be adverse for photosynthesis.

To assess the likely moisture stress over a period of years, it is useful to look at two of the standard irrigation regimes which are designed for deep-rooted crops. On plan 3, the soil moisture deficit is brought to 1 inch when it reaches 2 inches; and on plan 4, the deficit is brought to 2 inches when it reaches 5 inches. (It is not suggested that irrigation will in general be economic for this crop). Table 4 shows the number of years in twenty in which irrigation would be needed on these plans, and the mean adjusted need. (The adjustment consists in allowing rather less than the full water requirement in the five driest years in twenty).

TABLE 4 - Irrigation Needs on Two Plans

Area	Plan 3		Plan 4	
	Years in 20	Mean Need (mm)	Years in 20	Mean Need (mm)
9	16	90	12	75
12	18	115	13	100
24	19	245	17	200

It will be seen that Lancashire has the least irrigation need (and therefore water stress in the absence of irrigation) of the three areas considered.

5. Harvesting. Table 5 gives the dates of return to field capacity in the three areas.

TABLE 5 - Dates of Return to Field Capacity

Area	Median Date	Quartile Range
9	13 October	16 September–11 November
12	13 November	3 October–15 December
24	1 December	15 November–22 December

The table shows that on average lowland Lancashire returns to capacity a month before the Vale of York, and six weeks before East Anglia. In a wet autumn, harvesting in Lancashire could be a problem, particularly for a farmer who also had potatoes to cope with.

6. Conclusions. Generally, the climate of lowland Lancashire is as well adapted to growing sugar beet as the traditional areas for the crop in this country. The only serious doubt concerns the harvesting of large acreages in a wet autumn.

Any comments or suggestions on this paper should be referred to the author.

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AGROCLIMATIC AREAS IN ENGLAND AND WALES.

Areas considered in this note